Do edaphic factors influence the biogeography of legumes species in the Cape Floristic Region of South Africa?

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The species composition of plant communities in the Cape Floristic Region (CFR) of South Africa is associated with the parent rock, and the resultant overlaying soil that has varied soil nutrient levels. Legume species occur in distinct populations in varying habitats ranging from water seeps, river valleys and mountain slopes to quite arid areas. For example, species of *Psoralea* occupy wet areas whilst those of *Otholobium* occur in dry sites. We hypothesized that soils of the legume habitats are more fertile than those of non-legume areas in the CFR, despite variation in soil nutrient composition between different legume species. The chemical properties of soils from legume and adjacent non-legume areas from two sandstone (Bainskloof and Silvermine) and granite sites (Jonkershoek and Camps Bay), and from 12 sites occupied by legumes (*Psoralea* spp. and *Otholobium* spp.) were determined. Soils derived from sandstone were less fertile than granitic soils. The pH of legume soil at Bainskloof (2.98) and Silvermine (3.35) was significantly ($P<0.05$) lower than non-legume soils, but did not differ at the granitic Jonkershoek and Camps bay sites. In contrast, the concentrations of C, K, Ca, Mg or Na were significantly ($P<0.05$) greater in legume soils relative to the non-legume soils, probably due to increased rates of plant biomass turn-over associated with stands of legumes. Despite these differences between legume and non-legume sites, considerable variation exists between the soils occupied by different legume species. For example, the soils in areas occupied by *Psoralea* had higher concentrations of NH_4^+ and C than those occupied by *Otholobium*. We conclude that the legume soils, especially of the infertile sandstone sites, contained more nutrient elements than the non-legume soil, and that soil levels of NH_4^+, C, and to some extent total P influence the distribution of *Psoralea* and *Otholobium* species in the CFR.

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Pharmacological evaluation as a tool in South African orchid conservation

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The medicinal plant trade industry serves as an alternative income source for many poor South Africans. Plant material is being sourced from wild populations to support this growing industry; placing many rare species at extreme risk. This investigation studied pharmacological techniques that scientifically validate the ethnobotanical use of certain orchid species. Microdilution techniques were used to test for antimicrobial activity while inhibition of the cyclooxygenase enzyme indicated anti-inflammatory activity. *Eulophia* sp. organic extracts exhibited significant activity against Gram (+) bacteria with the highest inhibitory activity being observed in the petroleum ether pseudobulb extract against *Bacillus subtilis* (<0.098 mg/ml). Poor inhibitory activity was exhibited for *Ansellia africana* leaf, stem and root extracts against all test bacteria; with the exception of stem and root extracts against *B. subtilis*. Both fungistatic and fungicidal effects were observed in dichloromethane stem and pseudobulb extracts of *Eulophia* sp. (0.780 and 0.650 mg/ml) respectively. The anti-inflammatory evaluation revealed that, while the extracts were not selective for either the COX-1 or the COX-2 isozymes most plant extracts produced high levels of activity against both isozymes. Based on the results obtained, it can be recommended that, the leaves of both *Ansellia africana* and *Eulophia* sp. be used as a substitute for the roots that are commonly used in traditional medicine to treat inflammatory conditions. While the results validate the ethnobotanical use of these orchids in traditional medicine, pharmacological findings stimulate research into alternatives that will assist in plant conservation initiatives that eliminate destructive harvesting of rare species.

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Shaping inflorescence architecture – A successful alternative to floral specialisation

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Beyond floral specialisation, plant reproductive systems are shaped by the architecture of inflorescences presenting flowers in space and time. Spatial arrangement is often correlated with the foraging behaviour of the pollinators while the flowering sequence directly influences the breeding system. This is particularly true in modular constructed inflorescences in which floral units (modules) are repeated on different branch orders. As this repetition allows modifications with age, it represents a highly flexible basis for changes in sex expression and sex distribution, thus, the pollen receptor and pollen donator functions of an individual. In the present paper the shaping of inflorescence architecture is illustrated in South African representatives of the Apiaceae, Bruniaceae, Euphorbiaceae and Asteraceae. The examples correspond in self compatibility, freely accessible pollen and nectar rewards, small and simple flowers and promiscuous pollination. They differ in sex distribution (hermaphrodites, andromonoecy, monoecy, gynomonoecy), sex expression (protandry, protogyny) and inflorescence organisation (cephaloid, umbel,